TITLE

by

Kraig Andrews

DISSERTATION

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MAJOR: Physics

Approved by:

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Advisor

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This is a dedication.

"The fact that we live at the bottom of a deep gravity well, on the surface of a gas covered planet going around a nuclear fireball 90 million miles away and think this to be normal is obviously some indication of how skewed our perspective tends to be."

— Douglas Adams, The Salmon of Doubt: Hitchhiking the Galaxy One Last Time

ABSTRACT

TITLE HERE

by

AUTHOR NAME

August 2008

Advisor: Professor Your Prof

Major: Physics

Degree: Doctor of Philosophy

Abstract here

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Acknowledgements here

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List of Symbols

Symbol	Description	Unit
$\mathbf{A}$	vector potential	$\mathrm{V\,s\,m^{-1}}$
A	area	$\mathrm{cm^2}$
B	magnetic field	T
C	capacitance	F
E	electric field	$\mathrm{V\,m^{-1}}$
E	energy	eV (J)
E_F	Fermi energy	eV
E_g	bandgap energy	eV
$\hat{\mathbf{H}}$	Hamiltonian	add this
I	current	A
I_ds	drain current	A
L	length	µm
L	channel length	µm
m	mass	kg
$m^\star$	effective mass	kg
$\hat{\mathbf{p}}$	momentum operator	$\mathrm{kg\,m\,s^{-1}}$
R	resistance	$\mathrm{k\Omega\,\mu m}$ (Ω)
R_c	contact resistance	$\mathrm{k\Omega\,\mu m}$
R_H	Hall coefficient	$\mathrm{m^3\,C^{-1}}$
$\hat{\mathbf{s}}$	spin operator	$\hbar$ (J s)
T	temperature	K
V	voltage	V
V_bg	backgate voltage	V

V_{ds}	drain voltage	V
V_{H}	Hall voltage	V
w	channel width	µm
μ	magnetic moment	$\mathrm{eV\,T^{-1}}$
μ	mobility	$\mathrm{cm^2\,V^{-1}\,s^{-1}}$
μ_e	electron mobility	$\mathrm{cm^2\,V^{-1}\,s^{-1}}$
μ_{FE}	field-effect mobility	$\mathrm{cm^2\,V^{-1}\,s^{-1}}$
μ_{H}	Hall mobility	$\mathrm{cm^2\,V^{-1}\,s^{-1}}$
μ_p	hole mobility	$\mathrm{cm^2\,V^{-1}\,s^{-1}}$
ρ	resistivity	$\Omega\,\mathrm{cm}$
ρ_{xx}	longitudinal resistivity	add this
ρ_{xy}	transverse resistivity	add this
σ	conductivity	µS
σ_{xx}	longitudinal conductivity	add this
σ_{xy}	transverse conductivity	add this
τ	lifetime	s
Φ_{B}	barrier height	eV
$\Phi_{\mathrm{B}n}$	electron barrier height	eV
$\Phi_{\mathrm{B}p}$	hole barrier height	eV
Φ_M	metal work function	eV
Φ_S	semiconductor work function	eV
χ	electron affinity	eV
χ_S	semiconductor electron affinity	eV
ω_c	cyclotron frequency	add this

List of Physical Constants

Symbol	**Quantity**	**Value**
k_{B}	Boltzmann's constant	$1.380\,66 \times 10^{-23}\,\mathrm{J\,K^{-1}}$
		$8.617\,34 \times 10^{-5}\,\mathrm{eV\,K^{-1}}$
ϵ_0	dielectric constant	$8.854\,18 \times 10^{-12}\,\mathrm{A^2\,s^4\,kg^{-1}\,m^{-3}}$
e	elementary charge	$1.602\,18 \times 10^{-19}\,\mathrm{C}$
eV	electron volt	$1.602\,18 \times 10^{-19}\,\mathrm{J}$
c	speed of light	$2.997\,92 \times 10^{8}\,\mathrm{m\,s^{-1}}$
h	Planck's constant	$6.626\,07 \times 10^{-34}\,\mathrm{J\,s}$
$\hbar$	reduced Planck's constant	$1.054\,57 \times 10^{-34}\,\mathrm{J\,s}$ $(h/2\pi)$
$R_{\mathrm{K-90}}$	von Klitzing constant	$25\,812.807\,455\,55\,\Omega$
m_e	electron mass	$9.109\,383 \times 10^{-31}\,\mathrm{kg}$
$k_{\mathrm{B}}T$	Thermal energy	$0.025\,86\,\mathrm{eV}$ $(T = 27^{\circ}\mathrm{C})$
		$0.025\,26\,\mathrm{eV}$ $(T = 20^{\circ}\mathrm{C})$
μ_B	Bohr magneton	$9.274\,009 \times 10^{-24}\,\mathrm{J\,T^{-1}}$
		$5.788\,381 \times 10^{-5}\,\mathrm{eV\,T^{-1}}$
		$e\hbar/2m_e$ (atomic units)

Source: CODATA Recommened Values of the Fundamental Physics Constants: 2014, Mohr *et al.*[1]

Acronyms

2DEG two-dimensional electron gas

2DES two-dimensional electron system

2DHG two-dimensional hole gas

AFM atomic force microscopy

Au gold

BJD Bell Jar deposition

BP black phosphorus

CBM conduction band minimum

$C-V$ capcaitance-voltage

CVD chemical vapor deposition

DI deionized water

DFT density functional theory

DOS density of states

dHvA de Haas-van Alphen

EBL electron beam lithography

$F-D$ Fermi-Dirac

FET field effect transistor

FIB focused ion beam

FL Fermi level

FLP Fermi level pinning

FQHE fractional quantum hall effect

***h*-BN** boron nitride

IC integrated circuit

IPA isopropanol

IQHE integer quantum Hall effect

IR infrared

$I-V$ current-voltage

LL Landau levels

MEK methyl ethyl ketone

MFM magnetic force microscopy

MIBK methyl isobutyl ketone

MIGS metal induced gap states

Mo molybdenum

MoS_2 molybdenum disulfide

MOSFET metal-oxide-semiconductor field-effect transistor

N_2 nitrogen

Nb niobium

Ni nickel

NPGS Nanometer Pattern Generation System

PC polycarbonate

PE polymer electrolyte

PDMS polydimethylsiloxane

PL photoluminescence

PMMA polymethyl methacrylate

PPMS physical property measurement system

QHE quantum hall effect

Re rhenium

RF radio frequency

S sulfur

SB Schottky barrier

SBH Schottky barrier height

Se selenium

SEM scanning electron microscope

SdH Shubnikov-de Haas

SiO_2 silicon dioxide

STM scanning tunneling microscopy

Te tellurium

TE thermionic emission

TEM transmission electron microscopy

TFE thermionic-field emission

TFET tunneling field effect transistor

TFT thin film transistor

Ti titanium

TLM transmission line model

TMD transition metal dichalcogenides

UHV ultra-high vacuum

V vanadium

VBM valence band maximum

W tungsten

WS_2 tungsten disulfide

WSe_2 tungsten diselenide

Chapter 1

Chapter Title

1.1 Section Title

Contents here with Schottky barrier (SB).

References

[1] P. J. Mohr, D. B. Newell, and B. N. Taylor. Codata recommended values of the fundamental physical constants: 2014. *ArXiv e-prints*, jul 2015.

Autobiographical Statement

Name: Your Name

Education:
M.S. Physics, Some University, City, State, Year
M.S. Physics, Some Other University, City, State, Year
Professional Experience:
Some Job, Dept. of Physics and Astronomy, Somewhere, Year
Publications: "Paper Title" Journal Name

Your autobiographical statement.